UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/792,003	03/02/2004	Yiping Hu	H0004334--1065	4287

128 7590 06/07/2007

HONEYWELL INTERNATIONAL INC.
101 COLUMBIA ROAD
P O BOX 2245
MORRISTOWN, NJ 07962-2245

EXAMINER	
AUSTIN, AARON	

ART UNIT	PAPER NUMBER
1775	

MAIL DATE	DELIVERY MODE
06/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/792,003	HU ET AL.	
	Examiner	Art Unit	
	Aaron S. Austin	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,10,12,13,16,30,31,34-36,38-41 and 43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1-6,10,12,13,16,30,34-36,38-40 and 43* is/are allowed.

6)☒ Claim(s) *31 and 41* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,444,259 (Subramanian et al.).

Subramanian et al. teach incorporation of a separate barrier layer into the bond coat of a thermal barrier coating for a turbine component by varying material properties across its depth (abstract and column 5, lines 5-8). The first portion 60 of the bond coat layer 56 may be a mixture of MCrAlY with rhenium, tantalum, platinum, or alloys thereof (column 5, lines 8-14). The second portion 62 is material selected to maximize the coating's oxidative and corrosion resistance, such as an MCrAlY that does not include platinum (column 5, lines 14-20). More than two such portions may be used (column 5, lines 25-26).

Subramanian et al. do not teach the material of the second portion 62 as being a modified MCrAlY. However, they do teach more than two such portions may be used (column 5, lines 25-26). Therefore, as Subramanian et al. clearly teach the first portion 60 of the bond coat layer 56 may be a mixture of MCrAlY with rhenium, tantalum, platinum, or alloys thereof (column 5, lines 8-14) and more than two such portions may be used (column 5, lines 25-26) with a goal of providing the advantage of a bond coat

having varying material properties across its depth (column 5, lines 4-8), it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the barrier layer of Subramanian et al. comprising two or more modified MCrAlY first portions 60 having varying material properties such that one of the portions contains Pt and the other does not. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,444,259 (Subramanian et al.) in view of U.S. Patent No. 5,232,789 (Platz et al.).

Subramanian et al. teach incorporation of a separate barrier layer into the bond coat of a thermal barrier coating as described above.

Subramanian et al. do not teach the material of the second portion 62 as being a modified MCrAlY.

In addition to the arguments set forth above, Platz et al. teach MCrAlYX coatings provide oxidation and corrosion resistance wherein X is a rare earth (column 1, lines 31-42). Therefore, as Subramanian et al. clearly teach the second portion 62 is material selected to maximize the coating's oxidative and corrosion resistance (column 5, lines 16-17) and as Platz teaches MCrAlYX coatings provide the desired effects of oxidative and corrosion resistance (column 1, lines 31-42), it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the barrier layer of Subramanian et al. wherein the second portion comprises MCrAlYX wherein X is a rare

earth other than Pt. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,475,642 B1 (Zhao et al.) in view of U.S. Patent No. 6,444,259 (Subramanian et al.), and further in view of U.S. Patent No. 6,264,039 (Chyi).

Zhao et al. teach oxidation-resistant coating compositions for turbine components formed of an alloy, including modified MCrAlY alloys, on a superalloy substrate (column 5, line 11). The alloy includes at least one base metal selected from nickel, cobalt, iron, and combinations thereof (column 2, lines 3-5), at least one precious metal in the range of 4.5 to 29.3 wt. % (column 3, lines 1-5 and column 4, lines 9-12), and minor amounts of other elements such as hafnium and silicon (column 4, line 28). The at least one precious metal may be selected from members including Pt, Ru, and mixtures thereof (column 4, lines 10-13).

Zhao et al. disclose oxidation-resistant alloy coatings made from superalloys wherein the alloy coatings contain the same alloying elements as claimed by the Applicants with alloy elemental ranges that overlap Applicants' claimed alloy elemental range limits. See line 65 in column 1 to line 24 in column 3 and line 35 in column 3 to line 9 in column 9. Prior art which teaches a range within, overlapping, or touching the claimed range anticipates if the prior art range discloses the claimed range with sufficient specificity. See MPEP 2131.03 and *Ex parte Lee*, 31 USPQ2d 1105 (Bd. Pat. App. & Inter. 1993).

Further, the coatings may be applied in single-stage or multi-stage processes (column 2, lines 36-37) such as EB-PVD, electroplating, IPD, LPPS, CVD, plasma spray, HVOF, and the like (column 7, lines 38-45). These techniques, whether in a single or multi-stage process, may include induction melting followed by powder atomization (column 7, line 47). Thus an alloyed product may be applied as a powder to form the taught coating.

In the alternative, and in addition to, the above stated argument, Subramanian et al. teach cold spraying of bond coat powders provides the benefit of bond coats with reduced porosity and oxygen stringers (column 2, lines 28-34). Therefore, as Subramanian et al. clearly teaches cold spraying of alloyed powders provides the advantage of reduced porosity and oxygen stringers, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the bond coating taught by Zhao as alloyed powders for application as taught by Subramanian et al.

Zhao et al. do not specifically teach the presence of rhenium in the coating as a preferred precious metal. Rhenium is taught as being a known component (the Table of column 9). Further, they also teach the alloys as containing at least one precious metal, which often provides greater oxidation resistance for the coating, in a range of 1 atom % to about 30 atom % (column 4, lines 10-12 and 23-24).

Chyi teaches rhenium is a precious metal having oxidation resistance useful for high temperature applications (column 7, lines 20-26). Therefore, as Chyi clearly teaches rhenium is a precious metal and provides the advantage of use for high temperature applications due to oxidation resistance and as Zhao et al. teach rhenium

is a known component of their coating, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to use rhenium as one of the preferred precious metals taught by Zhao et al. as providing oxidation resistance for the coating. Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

Allowable Subject Matter

Claims 1-6, 10, 12, 13, 16, 30, 34-36, 38-40, and 43 are allowed.

Response to Arguments

Applicant's arguments, see the Remarks, filed 3/26/07, with respect to the objections to the claims and the rejection of claims 1-6, 34-36, 38-40, and 43 over Zhao in view of Subramanian and Plat have been fully considered and are persuasive in light of the present amendments. These objections and rejections have been withdrawn.

Applicant's arguments filed 3/26/07 with respect to the remaining prior art rejections have been fully considered but they are not persuasive.

Regarding rejection of claim 31 over Subramanian, Applicant argues the Pt or PT alloys present in the MCrAlY metal layer do not alloy with the MCrAlY metal to form a modified MCrAlY alloy, but instead remain as intermixed particles that function as independent components to function as diffusion blockers. This argument is found to be

unconvincing for three reasons. First, an alloy is a mixture of two or more metallic elements or metallic and nonmetallic elements. As Subramanian teaches a mixture of the elements claimed, the resultant layer is considered to be a modified alloy within the meaning of the term. Second, Applicant has not presented evidence to support the contention that the Pt taught by Subramanian remains intermixed and has also failed to define how such a mixture is not an alloy. As noted above, an alloy is a mixture of components with a metal and does not require the fusion of the components due to heat, as Applicant appears to suggest. Third, even if heat were required to form an alloy, use of the structure taught by Subramanian as a turbine component will supply sufficient heat to fuse the components at which time the structure fulfills the requirements Applicant argues are not met. For these reasons the rejections are maintained.

Further, Applicant argues the second layer (62) disclosed by Subramanian is not a modified MCrAlY alloy within the meaning taught in the present specification (pointing to paragraphs [0051] and [0052]). However, as noted in the rejection, while Subramanian does not teach the material of the second portion 62 as being a modified MCrAlY; they do teach more than two such portions may be used (column 5, lines 25-26). Therefore, as Subramanian et al. clearly teach the first portion 60 of the bond coat layer 56 may be a mixture of MCrAlY with rhenium, tantalum, platinum, or alloys thereof (column 5, lines 8-14) and more than two such portions may be used (column 5, lines 25-26) with a goal of providing the advantage of a bond coat having varying material properties across its depth (column 5, lines 4-8), it would have been obvious to one of

ordinary skill in the art at the time of the claimed invention to form the barrier layer of Subramanian et al. comprising two or more modified MCrAlY first portions 60 having varying material properties such that one of the portions contains Pt and the other does not. Therefore, while layer (62) may not be a modified MCrAlY, more than one layer (60) may be present. As Subramanian teaches layer 60 may comprise the claimed components, it is well within the skill in the art to form the upper layer of multi-layer 60 of the same components claimed.

Regarding rejection of claim 31 over Subramanian in view of Platz, Applicant argues neither reference teaches a method in which a first layer of Pt-including modified MCrAlY alloy is deposited on a superalloy substrate. However, Subramanian teaches the first portion 60 of the bond coat layer 56 may be a mixture of MCrAlY with rhenium, tantalum, platinum, or alloys thereof (column 5, lines 8-14). Thus the MCrAlY layer may be modified by the presence of platinum.

Regarding the rejection of claim 41 over Zhao in view of Subramanian and Chyi, Applicant argues Zhao and Chyi do not teach or suggest a powder composition. However, the coatings the coatings of Zhao may be applied in single-stage or multi-stage processes (column 2, lines 36-37) such as EB-PVD, electroplating, IPD, LPPS, CVD, plasma spray, HVOF, and the like (column 7, lines 38-45). These techniques, whether in a single or multi-stage process, may include induction melting followed by powder atomization (column 7, line 47). Thus an alloyed product may be applied as a

powder to form the taught coating. As such, Zhao does teach application of a powdered composition for coating a superalloy substrate comprising a MCrAlYX composition as claimed.

In the alternative, and in addition to, the above stated argument, Subramanian et al. teach cold spraying of bond coat powders provides the benefit of bond coats with reduced porosity and oxygen stringers (column 2, lines 28-34). Therefore, as Subramanian et al. clearly teaches cold spraying of alloyed powders provides the advantage of reduced porosity and oxygen stringers, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention to form the bond coating taught by Zhao as alloyed powders for application as taught by Subramanian et al.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron S. Austin whose telephone number is (571) 272-8935. The examiner can normally be reached on Monday-Friday: 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer McNeil can be reached on (571) 272-1540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ASA